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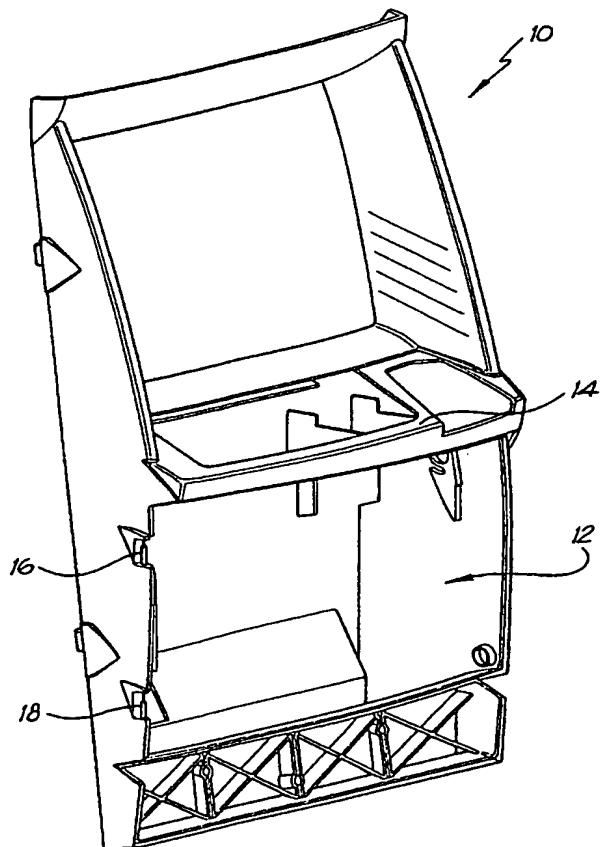
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(54) Title: **LIGHT CHAMBER FOR BELLY DOOR FOR GAMING MACHINE**



(57) Abstract: A belly door for a gaming machine includes a frame for receiving a sheet of artwork and a light reflective chamber having an open face which is located behind the frame when in a closed position. Clamping means are provided for clamping the artwork between the frame and the chamber. A recess extends along one edge of the chamber including sockets for receiving a fluorescent light tube when the chamber is in the closed position. A diffuser panel is disposed in the chamber behind the artwork located so as to be edge lit by the fluorescent light tube. The reverse face of the panel, which in use, faces the rear wall of the chamber defines a series of white opaque dots which in use, diffuse and direct the light in a forward direction perpendicular to the plane of the panel. The size of the dots in the panel increases with the distance of the dots from the fluorescent light tube. This arrangement ensures that the light panel produces a very evenly balanced lighting of the artwork.

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## LIGHT CHAMBER FOR BELLY DOOR FOR GAMING MACHINE

### Field of the Invention

This invention relates to gaming machines also referred to as slot  
5 machines, fruit machines or poker machines and in particular, it relates to a  
light chamber assembly for such as a gaming machine.

### Background of the Invention

A typical upright gaming machine comprises a cabinet and a main door  
10 which swings open on hinges to allow access to the interior of the cabinet.  
The main door may extend almost the entire length of the cabinet from its  
top to its bottom. In the middle of the door, there is usually a shelf area on  
which a number of control buttons are located for use by a player. Often, a  
bill acceptor is disposed beneath the shelf and a slot is provided in the shelf  
15 area allowing players to feed notes into the bill acceptor. It is common to  
have a door attached to the main door beneath the shelf, which is commonly  
referred to as a "belly door". The belly door allows access to the interior of  
the lower part of the gaming machine without the need to open the main  
door. Also "artwork" for the machine is usually displayed in the belly door.  
20 The artwork for the belly door usually comprises a sheet of optical quality  
acrylic material on which a design identifying the game is screen printed.  
The artwork may be edge lit by a fluorescent tube which is usually mounted  
in an assembly fixed to one vertical edge of the artwork.

Some designs include a horizontally oriented tube. One problem  
25 which arises is that the bill acceptor depends down from the shelf behind the  
belly door and this prevents a horizontally mounted fluorescent light tube  
from extending from one horizontal end of the artwork to the other horizontal  
end. Because it is not possible to light the artwork between the artwork and  
the bill acceptor, there is typically a shadow behind the artwork where the  
30 bill acceptor is positioned.

In some gaming machines, two fluorescent light tubes are provided,  
one mounted in a horizontal orientation behind the artwork and one  
mounted in a vertical orientation behind the artwork. However, this still  
produces uneven lighting and in particular, produces "hot spots" which are  
35 more backlit than other areas of the artwork.

The vertically mounted fluorescent tube mounted to the edge of the artwork discussed above, provides more even lighting. The tube is enclosed in a chamber having a C shaped cross-section which pivots about a mounting fitted along one edge of the artwork. The fluorescent light is positioned close to one edge of the belly door. It is a difficult and fiddly process to pivot the chamber, disconnect and remove the fluorescent light and replace it with another tube. Typically, it can take an engineer 15 minutes to change the artwork and fluorescent light tube.

It is an object of the present invention to alleviate the above mentioned disadvantages of the prior art.

### Summary of the Invention

Thus, in a first aspect of the present invention, there is provided an assembly, comprising:

- 15 a frame for receiving a sheet of artwork or the like;
- a light reflective chamber having an open face which is positionable behind the frame in a closed position;
- means for clamping the artwork between the frame and the chamber;
- means for mounting a fluorescent light tube on the frame; and
- 20 a recess extending along an edge of the chamber for receiving the fluorescent light tube when the chamber is in the closed position.

In a preferred embodiment, a diffuser panel is disposed in the chamber behind the artwork located so as to be edge lit by the fluorescent light tube. The panel may have a first (front) face and a second (reverse) face. The reverse face of the panel, which in use, faces the rear wall of the chamber, may define a series of white opaque dots which in use, diffuse and direct the light in a forward direction perpendicular to the plane of the panel. Preferably, the size of the dots in the panel increases with the distance of the dots from the fluorescent light tube. This arrangement ensures that the light panel produces a very evenly balanced lighting. The fluorescent light tube is preferably 7mm diameter.

The panel may be supported by a series of ribs projecting from the rear wall of the light reflective chamber.

35 The clamping means may comprise rotatable locking means defining wedge or cam surfaces co-operating with lugs defined on the frame.

It is preferred that the artwork is clamped between two gently curved surfaces defined by the frame and the chamber respectively.

The chamber is preferably hinged to the frame.

5    **Brief Description of the Drawings**

The invention will now be described, by way of example only, and with reference to the accompanying drawings in which:-

Figure 1 shows a main door for a gaming machine;

10    Figure 2 shows a front view of a frame for a belly door for the main door shown in Figure 1;

Figure 3 shows a rear view of the frame for the belly door shown in Figure 2;

Figure 4 shows a front view of a light chamber;

Figure 5 is a rear view of the light chamber shown in Figure 4;

15    Figure 5a is an enlarged view of a hinge component;

Figure 6 shows a light diffuser panel; and

Figure 7 is an assembled view of the belly door components.

**Detailed Description of Preferred Embodiment**

20    Referring to the drawings, Figure 1 shows a main door 10 for a gaming machine. The basic door 10 is shown before trim and other components are fitted. The door has an aperture 12 located below a shelf 14 on which control buttons are located on the finished door. The aperture is openable and closeable by a door known as a "belly door" (not shown in Figure 1). The 25 components of the belly door are shown in Figures 2 to 6. The belly door is mounted to the main door on two upstanding hinge pins 16, 18 disposed on one side of the aperture 12 of the door.

The belly door includes two main components, a light chamber 20 shown in Figures 4 and 5 and an outer frame 22 which is shown in Figures 2 30 and 3. The frame comprises a base member 24, two side members 26, 28 and a top member 30. As is best seen in Figure 3, a curved wall 32 extends along the front of the base member. A similar wall (not shown) depends downwardly from the top member of the frame. When viewed from the front of the belly door, the walls are convex and they define the upper and lower 35 edges of a frame for receiving artwork 33 (refer to Figure 7) which locates behind the walls.

Each side member 26, 28 defines an edge wall 34, 36, behind which two spaced projections 38 are provided which are oriented generally parallel to the edge wall but are spaced apart from the edge wall by a gap of typically about 5 to 10mm. The gap should be wider than the thickness of a sheet of artwork so that the edges of the artwork which is to be displayed in the frame can fit between the projections and the edge walls. Thus in use, artwork 33, can be dropped into the door frame from above with the edges of the art work being loosely retained (until clamped, as is explained below) between the projections 38 and the edge walls.

Also shown in Figure 3, are two mounts 40, onto which an elongate light means in the form of a fluorescent light tube 41 and a socket assembly 41a for mounting the light (not shown in Figure 3, refer to Figure 7) is mounted using screws. The fluorescent light has a diameter of about 7mm.

The belly door frame is hinged to the main door in conjunction with the light chamber on the hinge pins 16, 18 in a manner which will be described in more detail below. Figure 3 shows two outer sleeves 42 which in use, mount on the hinge pins 16, 18. The outer sleeves 42 are generally part annular in shape. These, comprise an outer hinge sleeve 44 and inner hinge sleeve 46 with a gap there between for receiving the hinge pins as is described below. The outer sleeve element 44 is taller than the inner sleeve element 46.

Also provided on one side member 28 of the frame is a pair of spaced lugs 39.

The light chamber 20 is best seen in Figures 4 and 5. The light chamber is preferably made from a white coloured plastics material. The light chamber has a generally planar rear wall 48 with side walls 50, 52 and a top wall 54. The front edge 56 of the top wall is convex and curved to match the curved wall at the top of the frame 20. At the base of the chamber, an elongate channel or recess 59, best seen in Figure 5, is defined. The channel extends the entire length of the base of the chamber and is sized and configured to receive the fluorescent light tube 41 and socket assembly 41a which is mounted to the frame 20. A projecting clamp element 58 is disposed above the channel and, as best seen in Figure 4, curves outwardly matching the curve of the wall 32 at the base of the frame 20. The protruding clamp element, does not extend back as far as the rear wall 48 of the chamber

but rather is mounted on a series of five projecting ribs 60 which space the wall element from the rear wall 48.

A diffuser panel 70 illustrated in Figure 6, locates in the chamber against the rear wall.

5       The diffuser panel is made of optical quality acrylic and has a series of opaque white dots screen printed onto the rear face of the panel. The dots 72 at the top 70B of the panel have a greater diameter than those at the bottom 70A of the panel. Typically, the smaller dots have a diameter of about 0.3mm. and are well spaced apart with the size gradually increasing up the 10 panel and the spacing decreasing to the relatively largest dots 72 having a diameter of about 0.5mm. The panel is 8mm thick. Figure 6 is stylised and does not represent the actual dimensions of the panel or dots. When the 15 bottom edge 70A of the panel is lit by the fluorescent light, light travels up the panel and is diffused and reflected forwards by the series of white dots to provide a very even diffuse light source from the panel which takes account 20 of the gradual reduction in the amount of light transmitted up the panel from the tube. Consequently, any art work held in the door frame in front of the panel is evenly lit.

With reference to Figure 5, two hinge elements 80 extend away from 25 one side wall 52 of the chamber on arms 82. The hinge elements are shown enlarged in Figure 5a. Each element has a part annular cross section comprising a first upper portion 86 having a diameter which steps down at a shoulder 85 to a lower portion 84 having a slightly narrower diameter. The walls of the hinge element are arcuate and extend around an angle of approximately 270° defining a gap between the free ends of the hinge 30 element. The hinge element locates within the sleeve elements provided in the frame, with the shoulder 85 resting on the top of the inner sleeve element 46. This allows the light chamber 22 to rotate about the hinge axis A relative to the frame 20. When the door frame and chamber are swung about to a particular relative orientation, gaps in the outer sleeves 42 and the hinge 35 elements 80 align and in this orientation, the chamber and frame can be mounted onto the hinge pins defined on the main door. Thus, the main door, the frame and the chamber may all rotate relative to each other about the same hinge axis A.

The chamber is locked in position to the reverse side of the belly door frame by means of a pair of rotatable locking cam means 100 which are

mounted on bosses 102 formed on the reverse side of the chamber. Each locking means defines a wedge or cam surface 104 which co-operates with the lugs 39 defined on the side frame of the belly door to gradually compress the artwork as it is turned. This has the effect of pushing the light chamber 5 against the rear of the front face of the frame. The art work is held securely between the chamber and the door frame and is gripped and curved between the curved walls of the frame and the projections of the chamber.

The design of the door frame has a number of significant advantages. The principal advantage is that it is much easier to access the components of 10 the belly door which need changing. in particular, the art work, which is changed whenever the game played on the gaming machine is changed. It is also a relatively simple matter to access and change the fluorescent light as only one light is required and it conveniently located at the base of the frame of the belly door frame.

15 The use of a thinner fluorescent tube allows the chamber in the belly door to be relatively thin and it can thus extend in front of the bill acceptor avoiding the shadow problem associated with the bill acceptor in existing gaming machines.

It will be appreciated by persons skilled in the art that numerous 20 variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

**CLAIMS**

1. A belly door assembly for a gaming machine comprising:
  - a frame for receiving a sheet of artwork or the like;
  - a light reflective chamber having an open face which is positionable behind the frame.
  - means for clamping the artwork between the frame and the chamber;
  - means for mounting an elongate light means on the frame; and
  - a recess extending along an edge of the chamber for receiving the elongate light means when the chamber is located behind and adjacent the frame.
2. An assembly as claimed in claim 1 wherein a diffuser panel is disposed in the chamber behind the artwork located so as to be edge lit by the fluorescent light tube.
3. An assembly as claimed in claim 1 wherein the panel has a front face and a reverse face and wherein the reverse face of the panel faces a rear wall of the chamber and define a series of white opaque dots which in use, diffuse and direct the light in a forward direction perpendicular to the plane of the panel.
4. An assembly as claimed in claim 3 wherein the dots on the panel increase in size with the distance of the dots from the fluorescent light tube.
5. An assembly as claimed in any preceding claim wherein the elongate light means is a fluorescent light tube having a diameter of about 7mm.
6. An assembly as claimed in any one of claims 3 to 5 wherein the panel is supported by a series of ribs projecting from the rear wall of the light reflective chamber.
7. An assembly as claimed in any preceding claim wherein the means for clamping include rotatable locking means defining wedge or cam surfaces co-operating with lugs defined on the frame adapted to clamp artwork between curved surfaces defined by the frame and the chamber respectively.

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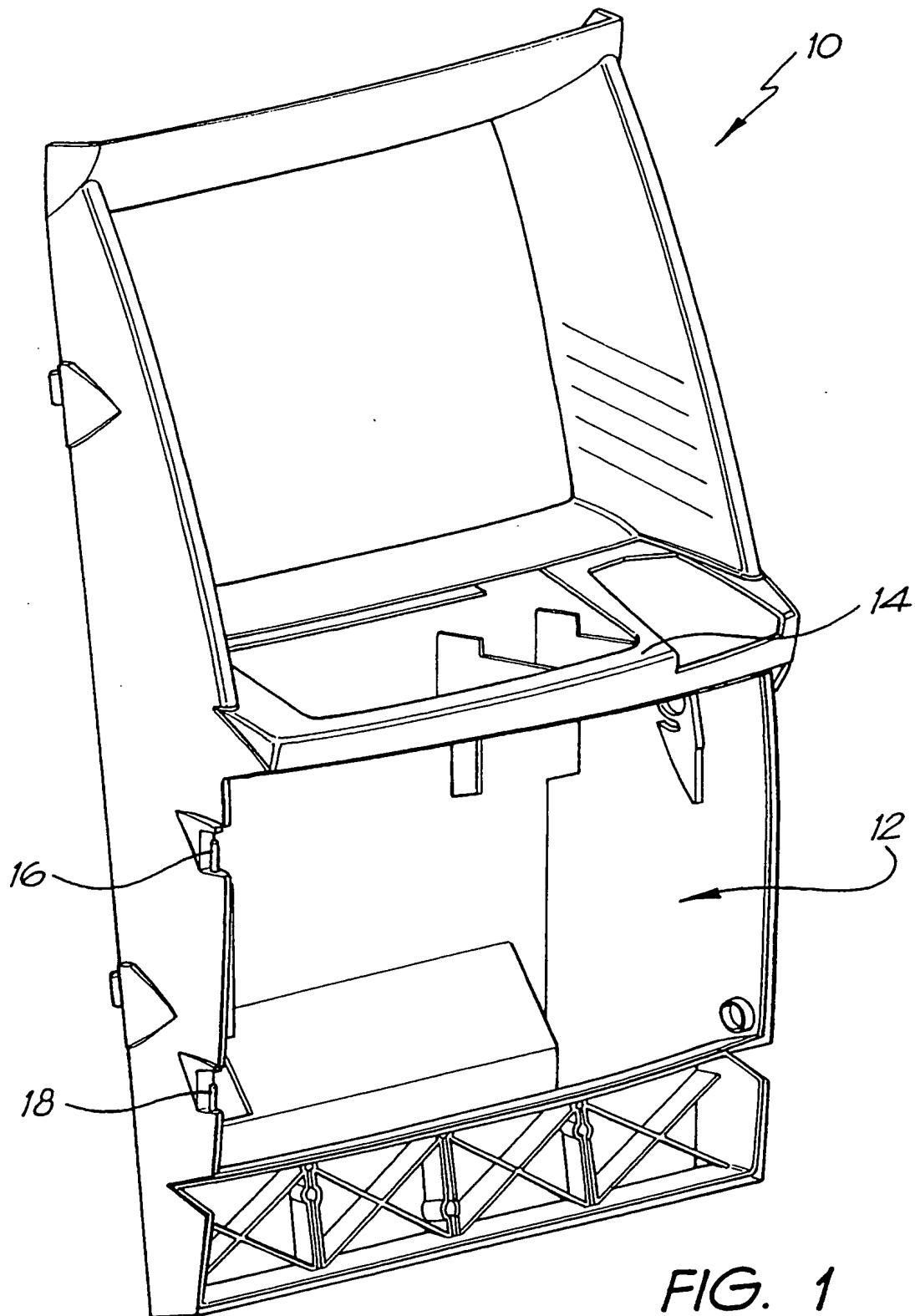


FIG. 1

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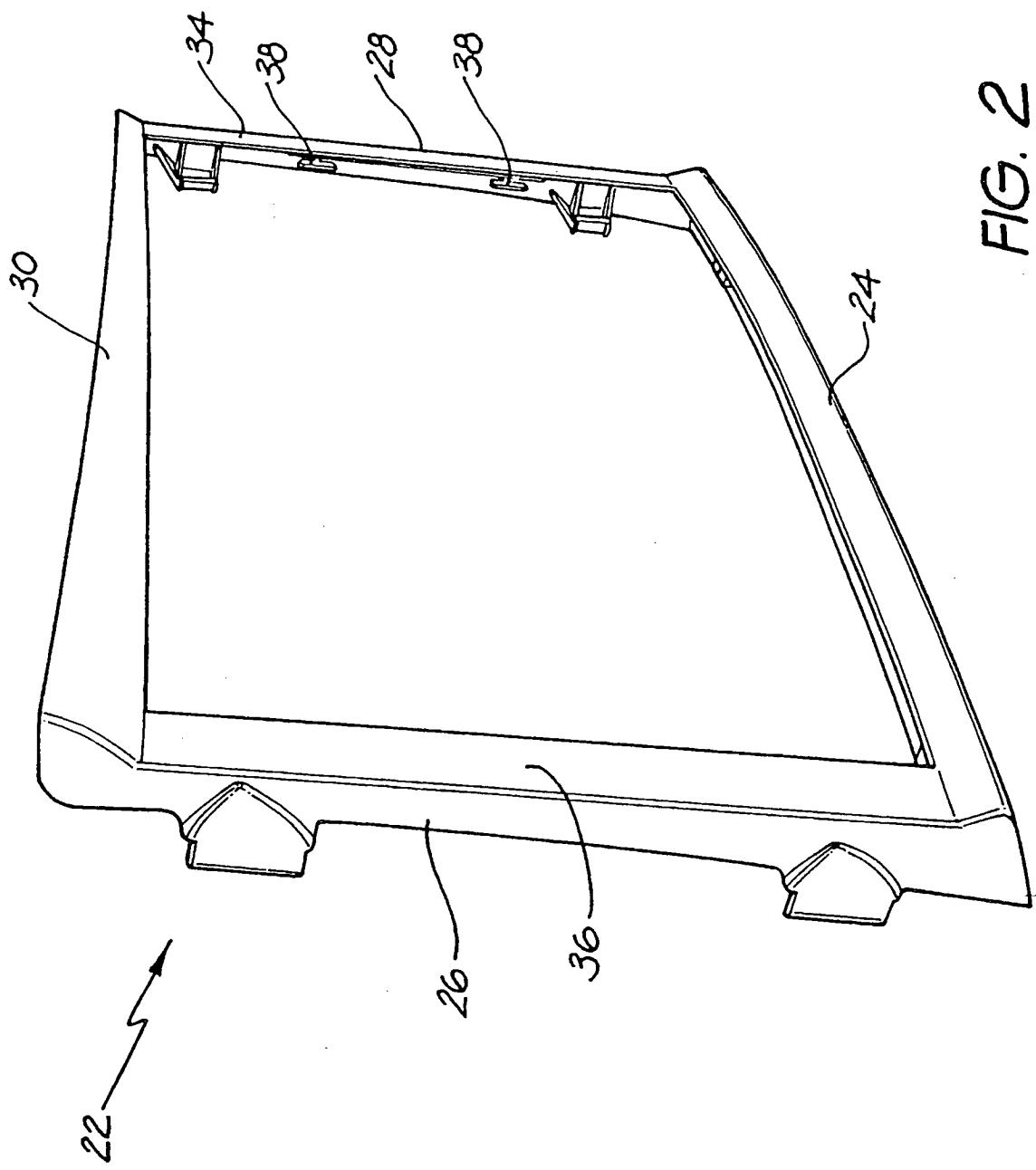


FIG. 2

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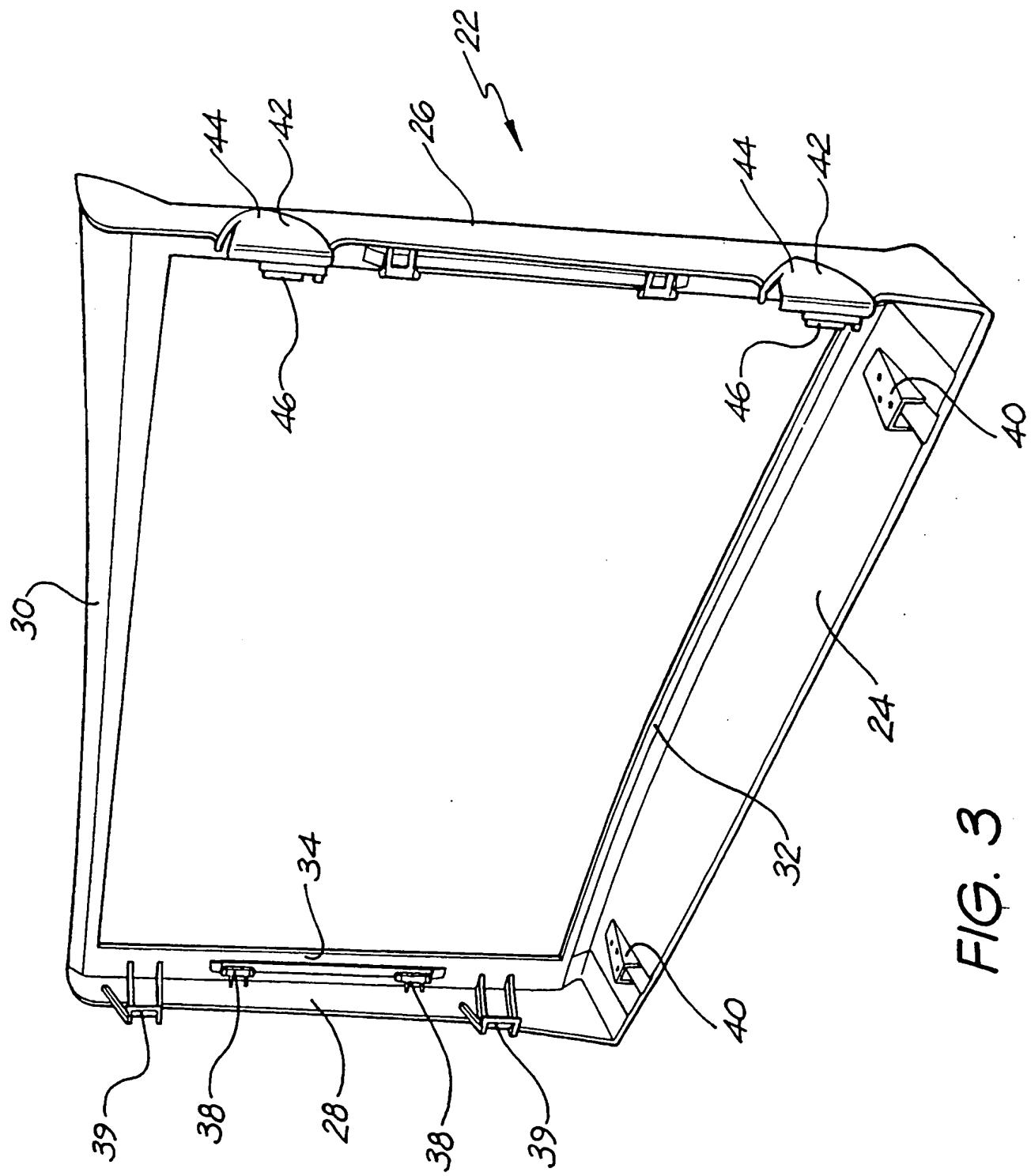


FIG. 3

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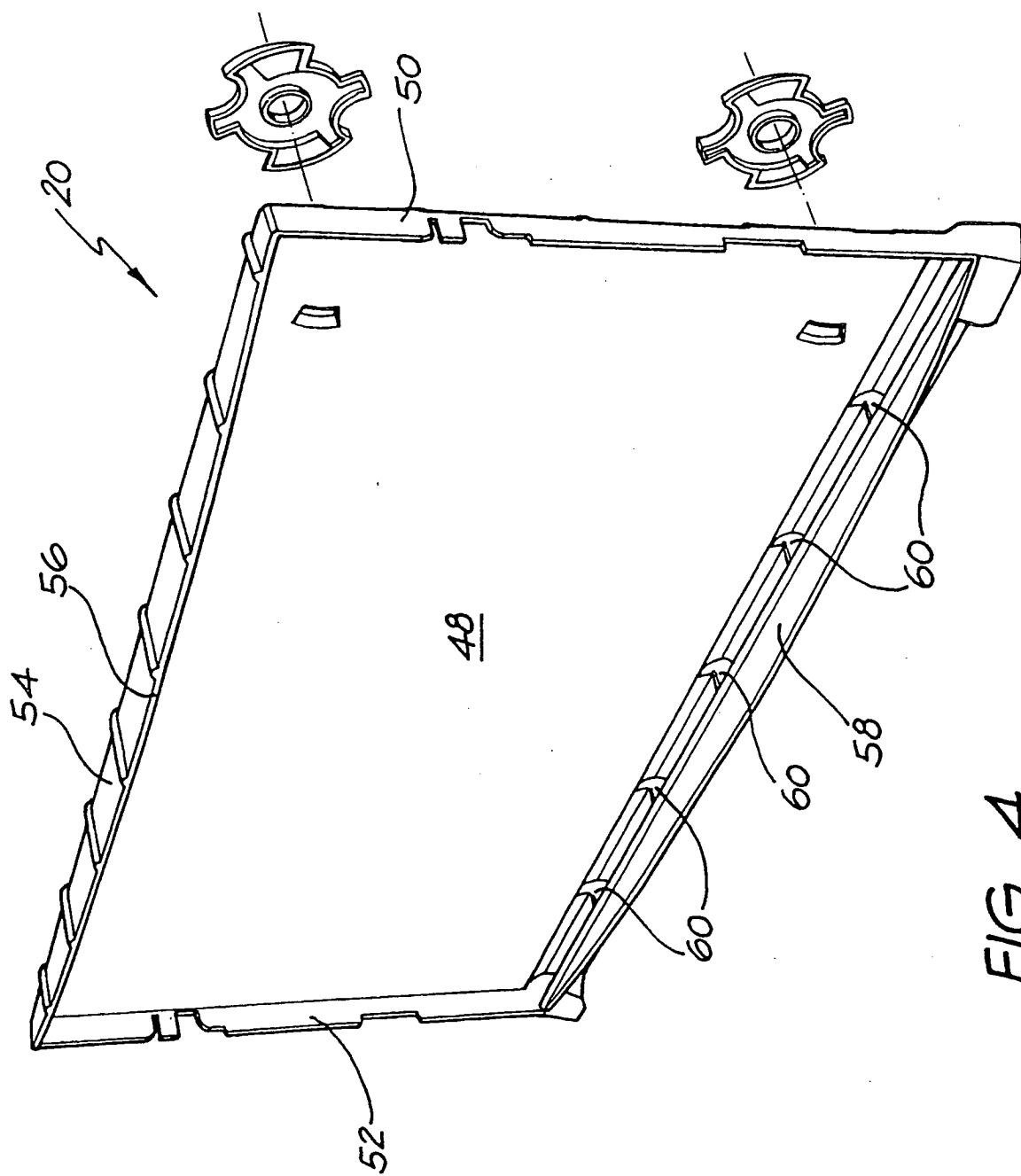


FIG. 4

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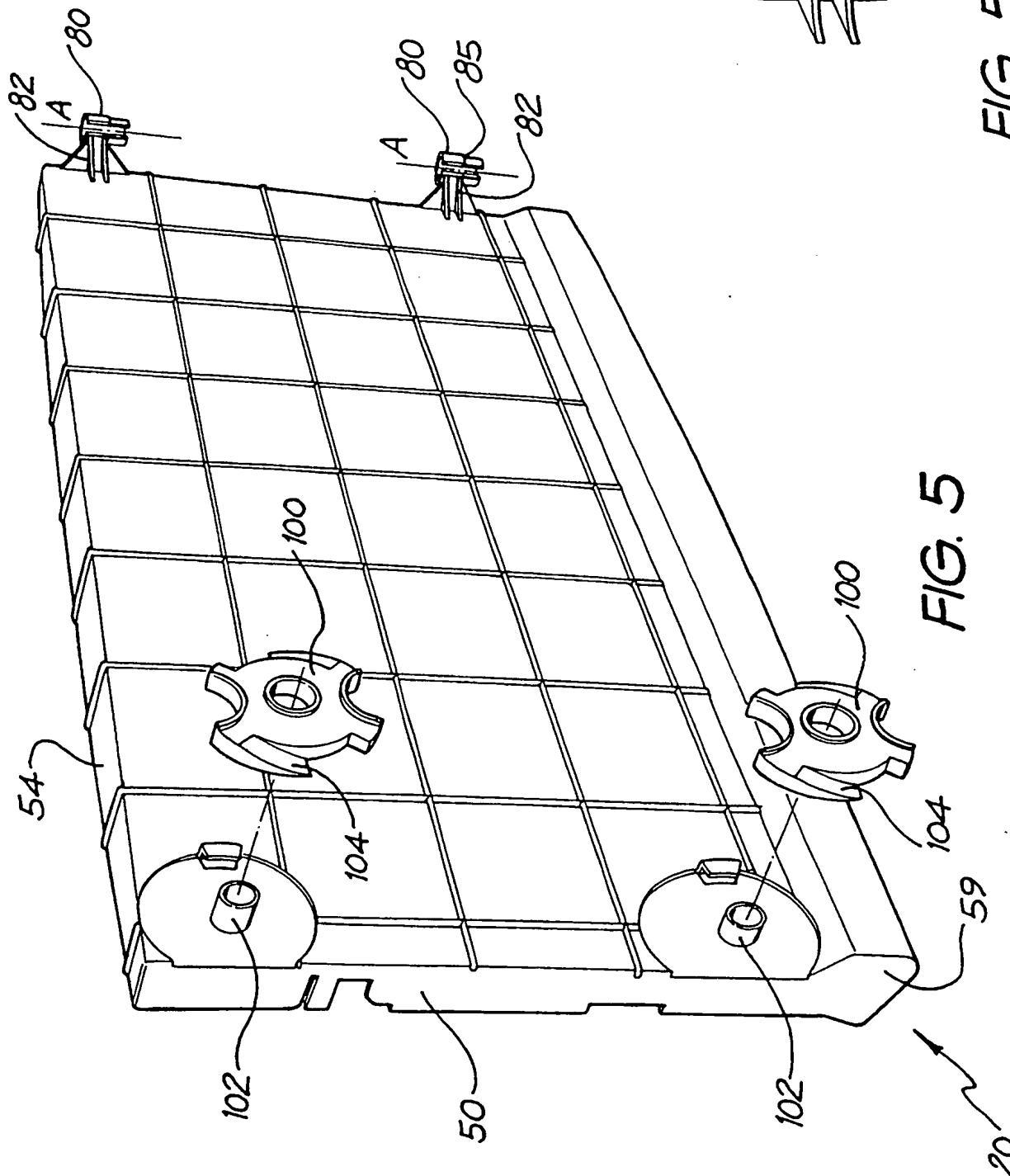


FIG. 5

FIG. 5a

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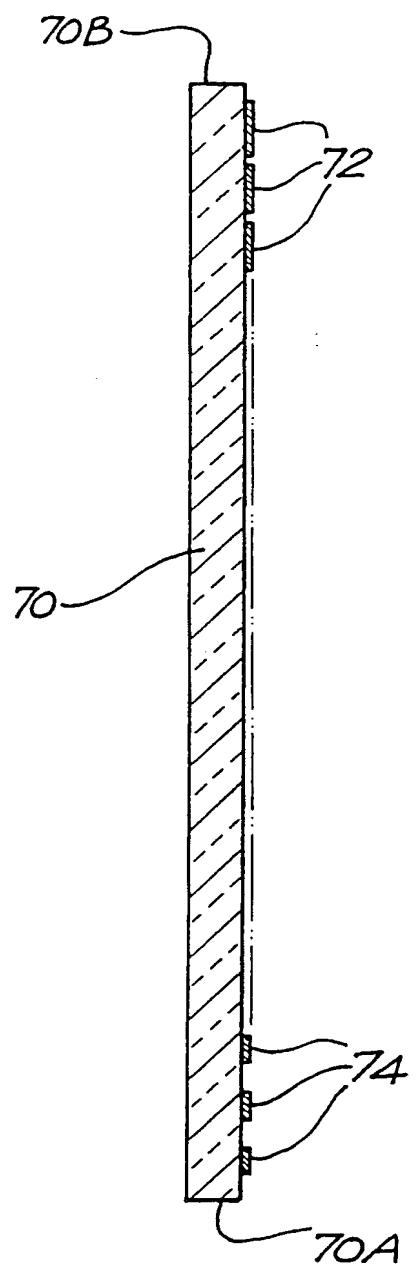
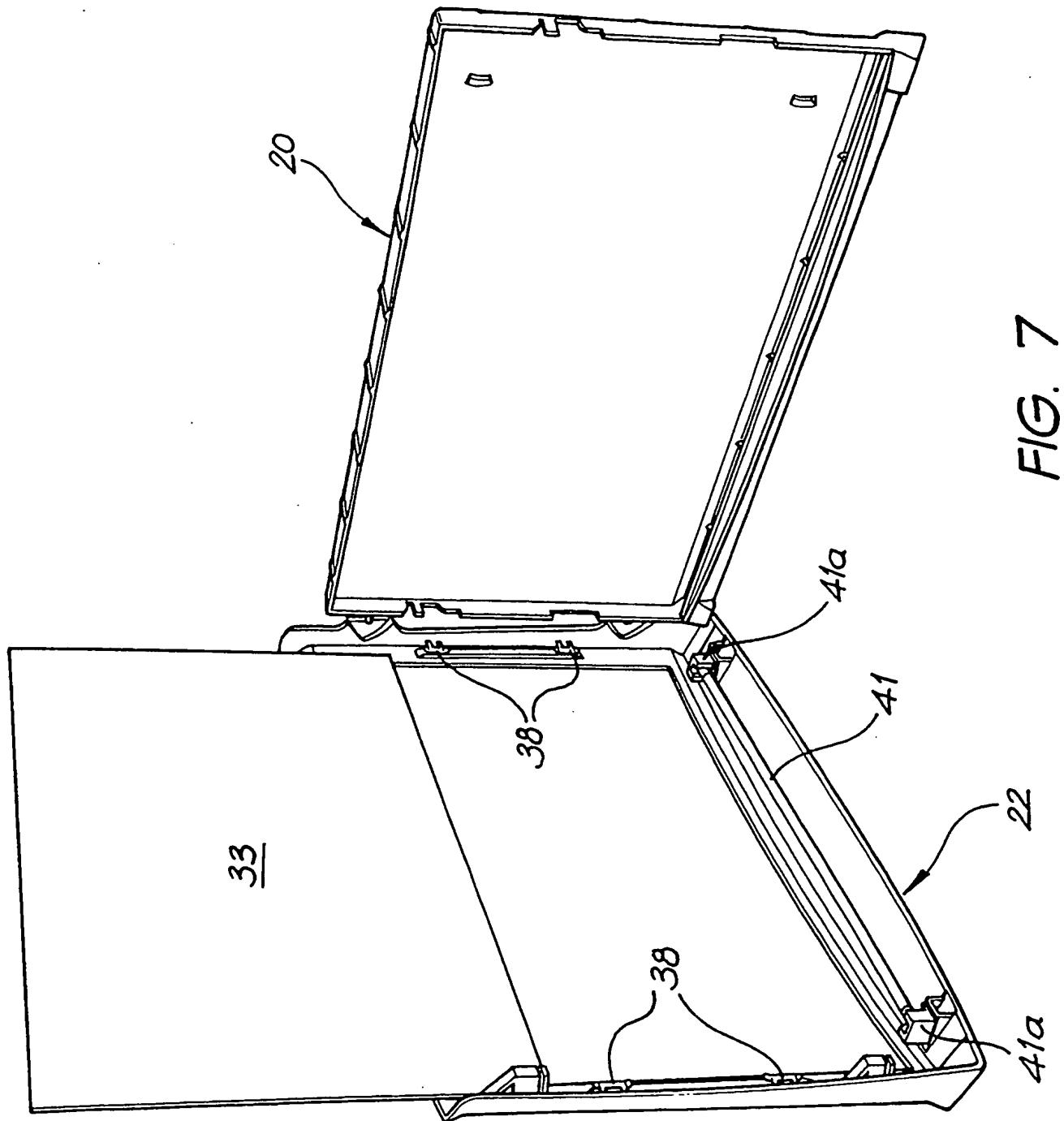


FIG. 6

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU00/01369

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int. Cl. 7: A63F 13/08		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) G09F 13/-		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT: (gaming or slot or fruit or poker machine) and door, G09F 13/- and diffuse		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4795155 A (GRANDE) 3 January 1989 Figures 1 and 2	1-7
Y	GB 2030750 A (PIERRE LO INTERNATIONAL) 10 April 1980 Entire document	1-7
Y	EP 561329 A (ENPLAS CORP) 22 September 1993 Entire document	1-7
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
Date of the actual completion of the international search <b>1 December 2000</b>		Date of mailing of the international search report <b>17 - DEC 2000</b>
Name and mailing address of the ISA/AU <b>AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929</b>		Authorized officer <b>CRAIG GLEGHORN</b> Telephone No : (02) 6283 2064

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International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 438768 A (MARKETING-DISPLAYS) 31 July 1991 Entire document	1-7
Y	US 4070779 A (GILMOUR) 31 January 1978 Entire document	1-7

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
**PCT/AU00/01369**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report			Patent Family Member	
US	4795155	NONE		
GB	2030750	NONE		
EP	561329	JP	5220674	
EP	438768	DE	4026870	
US	4070779	CA	1059762	

END OF ANNEX